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云南文山大窗鱼(*Macrothyraspis*)属一新种[1)]

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摘要:记述了产于云南文山古木早泥盆世坡松冲组华南鱼类大窗鱼一新种——长矛大窗鱼(*Macrothyraspis longilanceus* sp. nov.)。新种头甲呈头盔形,吻突与角均很发育,中背孔呈后缘前凹的桃形,头甲背面具一对蚕豆形的背窗,纹饰为细小的粒状瘤点,这些特征与属型种——长角大窗鱼(*Macrothyraspis longicornis*)相似。但新种吻突特别长,约为头甲中长的2倍,眶孔背位,两个背窗之间脑腔和迷走腔区域相对较宽,两个侧向延伸的角向后倾斜,末端不前翘等,与属型种区别明显,应为该属的一新种。

关键词:云南文山,下泥盆统,无颌类,盔甲鱼类

中图法分类号:Q915. 861 **文献标识码**:A **文章编号**:1000－3118(2005)04－0304－08

1 前言

本文所描述的化石材料采自云南文山市南郊古木镇纸厂坡松冲组。该组系廖卫华等(1978)建立,代表滇东南一带泥盆系底部的碎屑岩沉积,岩性以棕黄－灰黑色细砂岩、泥质粉砂岩为主,顶部夹黑色页岩。

滇东南文山地区的坡松冲组中目前已发现大量早期脊椎动物化石,主要有盔甲鱼类、胴甲鱼类和肉鳍鱼类,其中盔甲鱼类主要包括 *Kwangnanaspis subtriangularis*(曹仁关,1979)、*Gantarostrataspis gengi*、*Gumuaspis rostrata*(王俊卿、王念忠,1992)、*Macrothyraspis longicornis*(Pan,1992)、*Wenshanaspis zhichangensis*、*Sanqiaspis rostrata*(赵文金等,2002)。除了早期脊椎动物化石外,该组还产植物和孢子化石,植物化石主要有 *Zosterophyllum australianum*、*Z. longum*、*Taeniocrada* sp.、*Dawsonites* sp.、*Protopteridium* sp.、*Drepanaphycus*? sp.、*Stachyophyton yunnanense* 等(廖卫华等,1978;侯鸿飞、王士涛,1988;王怿、蔡重阳,1996);而孢子化石则主要以 *Apiculiretusispore plicata*－*Dictyotriletes emsiense*(PE)组合为代表(王怿,1994)。

1) 国家重点基础研究发展规划项目(编号:G2000077704)、国家自然科学基金重点项目(编号:40332017)、IGCP491 项目和国家基础科学特殊学科点人才培养基金资助。

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2 标本记述

盔甲鱼亚纲 Galeaspida Tarlo, 1967

多鳃鱼超目 Polybranchiaspidida Janvier, 1996

华南鱼目 Huananaspidiformes Janvier, 1975

大窗鱼科 Macrothyraspidae Pan, 1992

大窗鱼属 *Macrothyraspis* Pan, 1992

长矛大窗鱼(新种) *Macrothyraspis longilanceus* sp. nov.

(图1~4)

词源 *longus* (L.),长的,*lanceus* (L.),矛形的,*longilanceus*,表示该鱼的吻突特别长,呈长矛状。

正型标本 一件完整头甲的内外模,中科院古脊椎所标本登记号 IVPP V 13592.1A,B。

归入标本 一件不完整头甲的内外模,IVPP V 13592.2A, B。

产地与层位 云南文山古木镇纸厂村,早泥盆世布拉格期,坡松冲组下部。

特征 中等大小的大窗鱼类。头甲呈头盔形,具发育的吻突和角;吻突细而长,呈长矛状,长约为头甲中长的2倍;角侧向延伸,略向头甲后方倾斜,末端不前翘,内角小而清晰;眶孔较小,背位,靠近头甲侧缘;中背孔大,呈桃形,后缘稍前凹;松果孔小,位于眶孔后缘连线和背窗之间,松果孔前区短于松果孔后区;一对大的背窗位于头甲鳃区背面,大小和形状与蚕豆相近,两个背窗之间脑腔和迷走腔区域相对较宽;感觉沟系统不甚发育,仅见前眶上管、后眶上管和背联络管,侧背管及侧横管不发育。前眶上管短而平直,位于中背孔的后外侧,后眶上管短而不相连,呈倒“八”字形,相对排列在松果孔正前方,背联络管1条,短而不相连;鳃囊6~7对,纹饰为细小的粒状瘤点。

描述 正型标本的内模(V 13592.1A)(图1)保存十分完整。整个头甲(包括吻突和角在内)状似古代武士的头盔,头甲保存长度(含吻突)为73.3 mm,保存宽度(含角)76.0 mm,如果不把吻突和角考虑在内,头甲则近乎为等边三角形,中长(由中背孔前缘至头甲后缘)26.0 mm,宽(不含角)23.3 mm,长略大于宽。吻突和角均很发育,吻突细而长,呈长矛状,前端缺失,保存长度为47.3 mm,估计长度为57 mm,吻突长超过头甲中长的2倍;角较为细长,侧向延伸,并向头甲后方自然倾斜,末端不前翘。正型标本左侧的角保存完整,长约32 mm,右侧的角末端缺失,仅保存21.3 mm,据此可以估计包括角在内的整个头甲的最大宽度可达87 mm。另外,吻突和左右两个角几乎把头甲的边缘(包括侧缘和后缘)分成三等份。内角不甚发育,但小而清晰。

头甲侧缘向腹面折曲形成明显的腹环。头甲的间带部分较短;头甲后缘近平直,中部向后突并形成一短而小的背棘。

整个头甲背面被大小不等的6个孔洞穿:1) 最前端较大的一个为中背孔,呈桃形,长宽近相等,孔径在V 13592.1中约为6.0 mm,在V 13592.2中约为4.8 mm,中背孔的后缘略向前凹,大致与两眶孔的前缘连线齐平;2) 其后一对为圆形的眶孔,较小,背位,靠近头

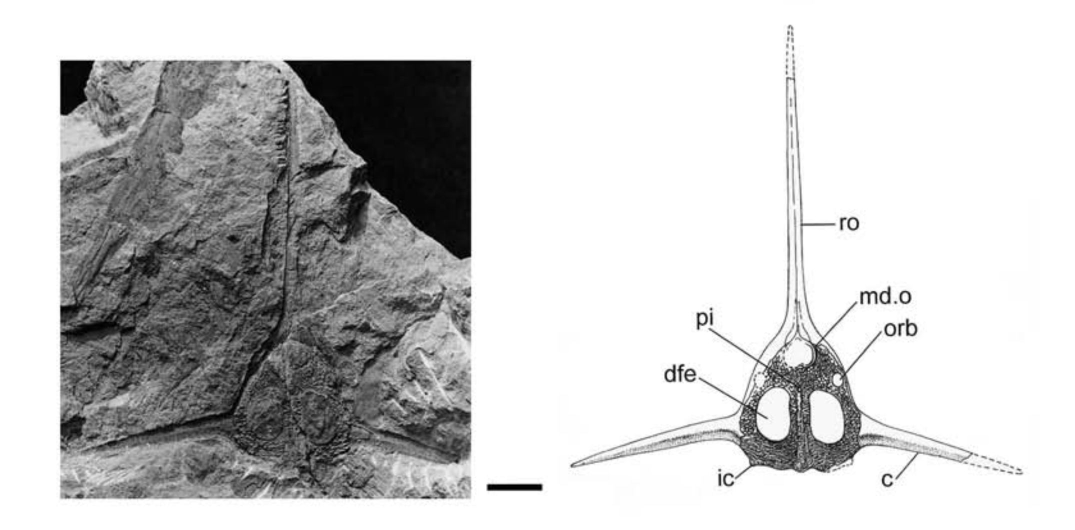


图1 长矛大窗鱼(新种)—完整头甲的内模(IVPP V 13592.1A, 正型标本),背视,比例尺 =1 cm

Fig.1 Internal mould of a complete cephalic shield of *Macrothyraspis longilanceus* sp. nov. (IVPP V 13592.1A, Holotype), in dorsal view, scale bar = 1 cm

简字说明 Abbreviations:c. corner 角; dfe. dorsal fenestra 背窗; ic. inner corner 内角; md.o. median dorsal opening 中背孔; orb. orbital opening 眶孔; pi. pineal opening 松果孔; ro. rostral process 吻突

甲侧缘,背视呈圆孔状,眶孔直径在 V 13592.1 中为 2.0 mm (图 1),在 V 13592.2 中,由于受挤压而略近椭圆形,长轴直径为 2.6 mm,短轴直径约为 1.5 mm (图 2)。眶孔位置较为靠前,中心连线刚好位于中背孔后缘和背窗前缘连线的中点上,距吻突较距头甲后缘要近些;3) 眶孔之后位于头甲中线上的小孔为松果孔,在所有孔中是最小的,直径在 0.8 ~ 1.0 mm 之间,位于两眶孔后缘连线之后,与背窗前缘几乎在一条直线上,松果孔前区短于松果孔后区;4) 位于头甲最后的一对大孔为背窗,在所有孔中是最大的一对,几乎占满了整个头甲后部,呈蚕豆形,长径在 V 13592.1 中为 10.6 mm,在 V 13592.2 中为 10.0 mm,短径分别为 6.6 mm,6.0 mm。两个背窗之间脑腔和内耳迷走腔的区域相对较宽,为 4 mm 左右,约占整个头甲宽度的 1/6,刚好位于鳃区的背面。在两背窗之间可以清楚地观察到脑腔和内耳的迷走腔,半规管的外端刚好与背窗的内缘相接。中背孔和背窗的外缘均有低而细的嵴状环。

正型标本的外模(V 13592.1B)保存了清晰的感觉管系统(图 3)。感觉管系统不甚发育,仅见前眶上管、后眶上管和背联络管。前眶上管位于中背孔的后外侧,较短,与中背孔近垂直排列;后眶上管也比较短,后端不相连而且相距较远,呈倒"八"字形,相对排列在松果孔的正前方;在两背窗之间还有一对短而不相连的感觉管,相对排列头甲中线附近,应与盔甲鱼类中广泛存在的背联络管相当。眶下管、侧背管及侧横管在现有的标本上观察不到,可能在新种中并不发育。

新种的内颅结构在 V 13592.1A 和 V 13592.2A 上均能看到,尤其是在 V 13592.2A 上更清楚。在标本上,脑腔被其他物质充填而呈突起状,同头甲相比它在比例上是非常小的。



图 2 长矛大窗鱼(新种)一较完整头甲的外模(IVPP V 13592.2B)，腹视，比例尺 =1 cm

Fig. 2 External mould of a complete cephalic shield of *Macrothyraspis longilanceus* sp. nov. (IVPP V 13592.2B), in ventral view, scale bar = 1 cm

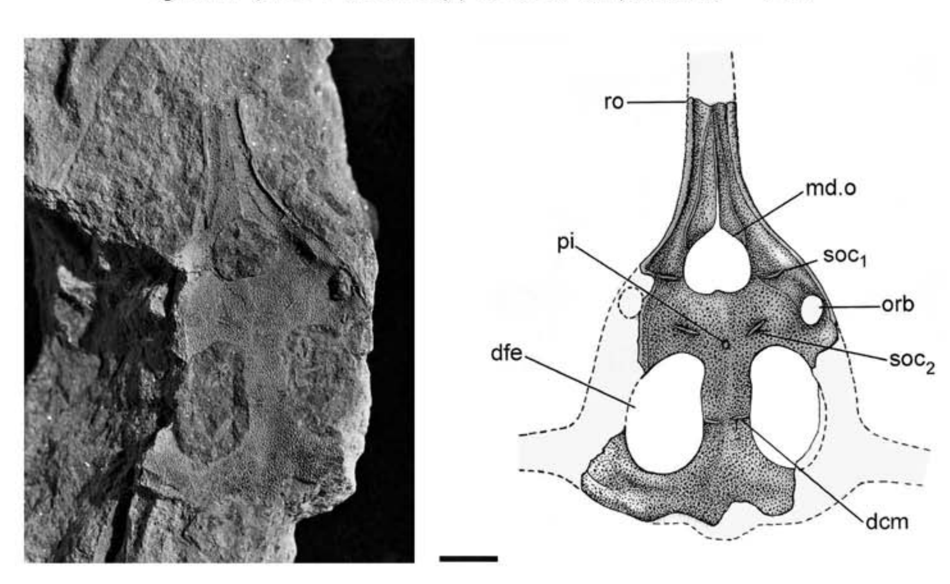


图 3 长矛大窗鱼(新种)一不完整头甲的外模(IVPP V 13592.1B，正型标本)，腹视，比例尺 =5 mm

Fig. 3 External mould of an incomplete cephalic shield of *Macrothyraspis longilanceus* sp. nov. (IVPP V 13592.1B, Holotype), in ventral view, scale bar = 5 mm

简字说明 Abbreviations：dcm. dorsal commissure 背联络管；dfe. dorsal fenestra 背窗；md. o. median dorsal opening 中背孔；orb. orbital opening 眶孔；pi. pineal opening 松果孔；ro. rostral process 吻突；soc_1. anterior supraorbital canal 前眶上管；soc_2. posterior supraorbital canal 后眶上管

整个脑腔从前到后的宽度几乎是一样的。所有的神经和血管通过的管均没有保存。脑腔的5个主要部分,除端脑腔观察不到外,其他4部分均能清楚地分辨出来,它们包括间脑腔(dic)、中脑腔(mes)、后脑腔(met)和延脑腔(mye)(图4)。



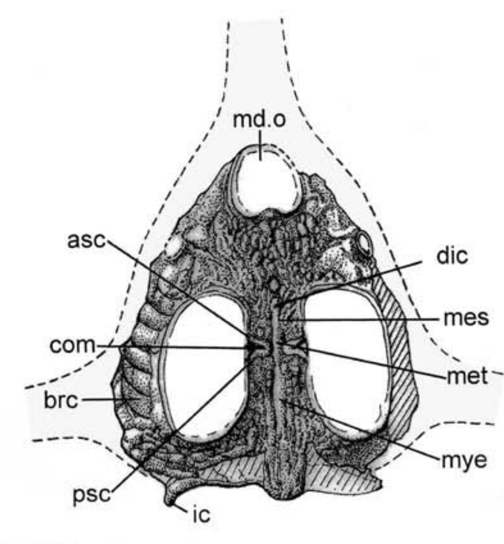


图4 长矛大窗鱼(新种)—不完整头甲的内模(IVPP V 13592.2A),背视,比例尺=5 mm

Fig.4 Internal mould of an incomplete cephalic shield of *Macrothyraspis longilanceus* sp. nov. (IVPP V 13592.2A), in dorsal view, scale bar = 5 mm

简字说明 Abbreviations: asc. anterior semicircular canal 前半规管; brc. branchial chamber 鳃囊; com. commissural division of anterior and posterior semicircular canals 前后半规管的联合部; dic. diencephalic portion of cranial cavity 间脑腔; ic. inner corner 内角; md. o. median dorsal opening 中背孔; mes. mesencephalic portion of cranial cavity 中脑腔; met. metencephalic portion of cranial cavity 后脑腔; mye. myelencephalic portion of cranial cavity 延脑腔; psc. posterior semicircular canal 后半规管

脑腔的间脑部分较窄,在其前部有一明显的松果孔管,它通过一个短管一直通到头甲,并开孔于头甲的背面。中脑腔部分很短,较细。后脑腔的中部略有膨大,它与中脑腔之间的界限明显,两者相接的部分开始膨大,内耳迷走腔的半规管位于后脑腔两侧。延脑腔在所有的脑腔中是最长的,前部膨大,向后逐渐变细。

内耳的迷走腔位于后脑腔的两侧,远离眶孔。两侧的半规管在V 13592.2A均保存得很完整。前半规管向前侧方延伸,直接通向背窗,前腹壶看不见或者不发育;后半规管向后侧方延伸,也是直接通向背窗,后腹壶看不见或者不发育。两半规管在后脑的中部相遇而形成一垂直联结部,其腹面可能与球囊相连。

标本V 13592.2A的头甲左侧背窗的外缘还出露了整齐的鳃囊(图4),鳃囊6~7对,与头甲中线近于垂直排列,鳃囊主体部分应位于背窗之下。

膜质骨上的纹饰为均匀分布的细小粒状瘤点,头甲背面每平方毫米大约有12~14个

瘤点(图 1, 2, 3)。

测量　见表 1。

表 1　大窗鱼属头甲测量与对比

Table 1　Measurements and comparison of cephalic shield of *Macrothyraspis*　(mm)

	M. longicornis		*M. longilanceus* sp. nov.	
	GM V 2077 (Holotype)	IVPP V 12741	IVPP V 13592.1 (Holotype)	IVPP V 13592.2
Length of cephalic shield (excluding rostral process)	25.0	29.0	26.0	23.3
Width of cephalic shield (excluding corners)	21.0	25.5	23.3	22.0
Length of rostral process	–	27.5	57.3	–
Length of corner	18.5	33.0	31.3	28.6
Length of orbital opening	2.3	2.0	2.0	2.6
Width of orbital opening	1.8	1.0	2.0	1.5
Length of median dorsal opening	7.0	6.0	6.0	4.8
Width of median dorsal opening	7.0	6.0	6.0	4.8
Length of dorsal fenestra	10.5	12.5	10.6	10.0
Width of dorsal fenestra	6.5	7.0	6.6	6.0
Width between two dorsal fenestrae	2.0	2.5	4.0	4.0

比较与讨论　大窗鱼属(*Macrothyraspis*)系潘江(1992)建立，目前仅有属型种长角大窗鱼(*Macrothyraspis longicornis*)一个种，发现地点为云南广南早泥盆世的坡松冲组。赵文金等(2002)在云南文山地区发现了长角大窗鱼的新材料，并对其特征作了补充描述和修订。本文所描述的新材料与赵文金等(2002)发现长角大窗鱼新材料的地点与层位相同。从前面描述看，新种与长角大窗鱼非常相似，如头甲均呈头盔形，吻突和胸角特别长，角后缘和头甲后侧缘不具三角形小刺，中背孔呈后缘前凹的桃形，头甲背面具一对蚕豆形的背窗，纹饰为细小的粒状瘤点等。这些特征基本上是大窗鱼属的定义特征。

通过进一步比较，我们发现新材料与长角大窗鱼存在以下明显差异：1）新材料的吻突特别长，其长度超过头甲中长的 2 倍，而长角大窗鱼的吻突相对较短，大致与头甲中长相当(表 1)。2）新材料的眶孔位置为头甲背位，背视呈圆孔状，而长角大窗鱼的眶孔位置为明显的侧位，背视呈缺刻状。3）新材料两个背窗之间脑腔和迷走腔的区域相对较宽，约占头甲宽度(不含角)的 1/6 左右，而后者相对较窄，约占头甲宽度(不含角)的 1/10 左右。4）新材料的角向头甲后侧方自然倾斜，末端不前翘，而后者的角末端略微向头甲前方翘起，该特征在潘江(1992)和赵文金等(2002)记述的标本中均表现一致，可能是长角大窗鱼的一个比较稳定性状。5）感觉管系统方面，两者之间也有所差异，可能与化石的保存状态有关，本文暂不作详细的比较。

鉴于以上比较，笔者认为文山的新材料与长角大窗鱼的差异明显，建议建立大窗鱼属的一新种——长矛大窗鱼(*Macrothyraspis longilanceus* sp. nov.)。

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A NEW SPECIES OF *MACROTHYRASPIS* (GALEASPIDA, AGNATHA) FROM WENSHAN, YUNNAN, CHINA

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Key words Wenshan, Yunnan, Early Devonian, Agnatha, Galeaspida

Summary

A new species of galeaspid agnathan, *Macrothyraspis longilanceus*, is described from the Early Devonian Posongchong Formation (Upper Pragian) at Zhichang village, Gumu Town, Wenshan District, southeastern Yunnan, China. As a typical non-marine deposit, the Posongchong Formation in southeastern Yunnan yields abundant remains of early vascular plants, antiarchs, sarcopterygians and galeaspids, the latter including *Kwangnanaspis subtriangularis* (Cao, 1979), *Gantarostrataspis gengi*, *Gumuaspis rostrata* (Wang and Wang, 1992), *Macrothyraspis longicornis* (Pan, 1992), *Wenshanaspis zhichangensis* and *Sanqiaspis rostrata* (Zhao et al., 2002).

Subclass Galeaspida Tarlo, 1967
Superorder Polybranchiaspidida Janvier, 1996
Order Huananaspidiformes Janvier, 1975
Family Macrothyraspidae Pan, 1992
Genus *Macrothyraspis* Pan, 1992
***Macrothyraspis longilanceus* sp. nov.**
(Figs. 1 ~ 4)

Etymology *longus* (L.) = long, *lanceus* (L.) = lance, in reference to the long rostral process of cephalic shield.

Holotype External and internal moulds of a complete cephalic shield, IVPP V 13592. 1A, B.

Referred specimens External and internal moulds of a nearly complete cephalic shield, IVPP V 13592.2A, B.

Horizon and locality Posongchong Formation, Pragian, Early Devonian, Zhichang village, Gumu Town, Wenshan, southeastern Yunnan, China.

Diagnosis A middle-sized galeaspid, cephalic shield armet-shaped with a small median spine at the posterior margin; rostral process lance-like, slender and about twice as long as the cephalic shield proper (i. e. the cephalic shield excluding rostral process and corners); corner projecting laterally and slanting backward; inner corner small but obvious; orbital opening dorsally placed and close to lateral margin of cephalic shield; median dorsal opening fairly large and peach-like; pineal opening situated slightly behind orbital openings, postpineal region of cephalic shield longer than prepineal region (excluding rostral process); dorsal fenestra on the dorsal side of cephalic shield very large and broad bean-shaped; region between paired dorsal fenestrae for cranial cavity and labyrinth cavity relatively broad; sensory canal system only with anterior supraorbital canal, posterior supraorbital canal and dorsal commissure; six ~ seven pairs of branchial chambers; ornament with evenly-distributed, minute round tubercles.

Remarks The type species of *Macrothyraspis*, *M. longicornis* was found from the Posongchong Formation of Guangnan, southeastern Yunnan (Pan, 1992). Additional material

of *M. longicornis* from the Posongchong Formation of Gumu, Wenshan District, southeastern Yunnan, was studied to clarify its defining characters (Zhao et al., 2002). The specimens described here were found from the same horizon and locality as those described by Zhao et al. (2002), but represent a new form. The new form resembles *M. longicornis* in such characters as cephalic shield armet-shaped, rostral process and corners well developed, no spines along posterior margin of corner, median dorsal opening large and peach-like, paired dorsal fenestrae on the dorsal side of cephalic shield large and broad bean-shaped, and ornament with minute round tubercles. So it can be definitely referred to *Macrothyraspis*.

However the new form is distinct from *M. longicornis* in characters as follows. 1) The rostral process of the new form is about twice as long as the cephalic shield proper, whereas the rostral process of *M. longicornis* is as long as the cephalic shield proper. 2) The orbital opening of the new form is situated at the dorsal portion of cephalic shield, and shows a round opening in dorsal view, whereas the orbital opening of the latter lies at the lateral margin of cephalic shield, and shows a semicircle in dorsal view. 3) The region between dorsal fenestrae for cranial cavity and labyrinth cavity in the new form is fairly broad, and about one-sixth of the cephalic shield in width. The region in the latter is narrow, and only one-tenth of the cephalic shield in width. 4) The corner of the new form projects laterally and slants backward. In *M. longicornis*, the corner projects laterally but turns forward at the end (Pan, 1992; Zhao et al., 2002). Based on these differences, a new species of *Macrothyraspis*, *M. longilanceus* sp. nov. is erected.

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